a sheet of white paper held parallel to the card and at right angles to the rays. Take a pin with a round head of black glass, of a diameter very little less than the hole in the card, and, holding it about an inch from the card, pass it very slowly across the hole. The bright image of the sun will then pass through all the stages of an eclipse, commencing with the "first contact" as the head of the pin first emerges into the rays at the edge of the circular disc of light, and forming all the successive crescent phases until it lies co-axially with the hole in the card, when the appearance of an "annular eclipse" is reproduced. Further movement of the pin in the same direction will reproduce the phases which occur after totality has been reached, giving, finally, the phase of "last contact."

If the bright annular ring of light be examined carefully when the "eclipse" is at its maximum, it will be seen to be free of blurs or blemishes if the edges of the hole and the head of the pin are both clean and free from projecting particles. Now coat the head of the pin with fine dust, such as flour or the pollen of a flower—even fine tobacco ash will suffice—and repeat all the above operations. No roughness, or only a very little, will be seen on the dark image of the "moon"—the pin's head—until the annular stage is reached, when quite suddenly there will appear black spots and streaks in the bright ring of light, giving one the impression that "Baily's beads" have been produced. Whatever may be the true cause of this latter phenomenon during an annular eclipse of the sun, such as was witnessed on April 17 last at some places, the effect in the experiment above cited may be produced in one of three ways: first, by roughening the surface of the pin's head; secondly, by dust on the edges of the hole; thirdly, by both the causes stated in the first and second cases acting simultaneously.

W. G. Royal-Dawson.

17 Pembridge Gardens, W., May 27.

Solar Halos on May 17.

The set of halos described by your correspondent (Nature, May 30) was also seen in London at the same hour. The inner one had a radius of about 22°, measured by the rough method of holding a stick at arm's length, and the outer one, of which only 60° or 70° were visible on the east, of approximately twice this angle.

Again on May 19 the inner halo was seen, and on May 27 both inner and outer, at approximately the same hour. To meteorologists it may be of interest to note that after none of these three dates did bad weather follow, as is usually expected.

The above values (22° and 46°) for the radii of the two halos are in accordance with the accepted explanation that they are due to refraction through ice-crystals, these being the angles of minimum deviation through prisms of 60° and 90° respectively, the refractive index of ice being taken as 1·31. About one point of the explanation of the text-books I should like to be allowed to ask a question. The tangent arc at the vertex of the halo, the mock-suns on the horizontal line through the sun, and the sun-pillar are said to be due to particular orientations of the ice-crystals being preponderant, that of laminate crystals with their axes horizontal and that of needles with their axes vertical. Perhaps someone that knows will be good enough to say whether these are possible positions of equilibrium of such bodies falling through air.

C. O. Bartrum.

32 Willoughby Road, Hampstead, May 30.

Earthquake of May 23.

The recent earthquake, reported as severe in Burmah, has left its record on our Milne seismograph by a displacement of the boom nearly as great as on January 3, 1911. On that date all the three needles of the magnetograph were shaken by the earth wave, and notably that of the horizontal force, of bifilar suspension. On the recent occasion of May 23 we find no indication of any mechanical disturbance of the needles. In the former waves the vertical movements must have been much more pronounced than on May 23.

The first tremors arrived here on May 23 at 2h. 36.6m. a.m., thirty-six minutes before the greatest swing of the boom, and this interval indicates on Milne's curve a distance of 56°—considerably short of Burmah. May it be that this was the trigger to start a stronger movement nearer to us, itself too weak to leave the mark of its first preliminaries on our films? This would be an illustration of the secondary earthquakes referred to by Milne in his Sixteenth Report of Seismological Investigations, p. 3 (from the British Association for the Advancement of Science, Portsmouth, 1911).

W. Sidgreaves.

Stonyhurst College Observatory, May 28.

Anatomy of the Bee's Sting.

During a recent inquiry into the existing knowledge of the chemistry of bee poison, I examined also the anatomy of the bee's sting, a subject to which I venture to direct attention. It is stated, and the evidence seems to be undeniable, that the sting of the worker bee is the insect's ovipositor metamorphosed into an efficient weapon of attack. On the basis of the principles of evolution, it would be said that the conditions producing the specialised activities of the worker bee required also the change indicated. By inference, obviously, one must turn to the queen bee, whose existence is justified solely by her egg-laying capacities, and who may have been specialised in this direction—an opposite one to that of the worker. But here, too, is found the same metamorphosis to an almost equal extent, so that it would seem, considering that the genital opening is below the base of the sting (itself the original ovipositor), that stinging was of vastly more importance to the queen bee than egg-laying. But since the queen employs her weapon a few times only during her life, this suggestion falls to the ground. The only other explanation seems to be that at a certain stage in the evolutionary development of insects the ovipositor underwent metamorphosis before bees and their specialism came into being as such, and that it persisted in this form.

I should be glad, indeed, if those versed in this branch of knowledge would "cast out the devil" of my perplexity.

Percy E. Spielmann.

21 Cadogan Gardens, London, S.W., May 14.

Clouds and Shadows.

The shadows to which Mr. Cyril Crossland refers in his letter to Nature of May 30 have straight, fairly well-defined edges, and are therefore certainly cast by the sun itself, which would be still visible to anyone in the high reflecting layer, whether to east or west of the observer. They are certainly not cast by light "reflected from the glowing clouds in the west," as Mr. Crossland thinks. The convergence of these rays towards the *east*, which the present writer has often seen, is purely a perspective

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effect. The rays themselves are in reality practically parallel, but seem to converge to east and west just as the parallel track of a straight railway seems to converge in both directions to anyone standing between the rails. The effect in the east soon after sunset is sometimes so striking that anyone might well believe that the sun had set there, were there no other circumstances to judge by.

T. C. Porter.

Upton, Slough, May 31.

Red Water.

In connection with the letters on "red water" in Nature of April 4 and 11, it may be of interest to state that a rusty-red coloration of brine and salt in evaporating pools of sea water is common on this coast.

I remember particularly such pools at Suez and near the Rawaya Salt Lake, in lat. 21° N. In the latter case the salt beds themselves, though also formed by the evaporation of sea water, remain quite pure white.

I have had no opportunity of examining the growth microscopically.

Another cause of red water is the occurrence of shoals of a large protozoan (? radiolarian) in the open sea. These are of sufficient size and density to colour large areas.

Cyril Crossland.

Sudan Government, Red Sea Province, Office
of the Marine Biologist, Dongonab,
May 5.

Zoological Nomenclature.

The Zoology Organisation Committee has decided to obtain the opinion of the zoologists of this country on the question of the strict application of the rule of priority as regards zoological nomenclature.

As it is not possible to draw up a complete list of those who are competent to form an opinion on this subject, I should be obliged if you would allow me to say that I shall be glad to send a copy of the voting papers to any British zoologist who will forward to me his name and address before June 30.

Sydney J. Hickson.
(*Hon. Sec. of the Z.O.C.*)

The University, Manchester, June 3.

THE DUNDEE MEETING OF THE BRITISH ASSOCIATION.

After a lapse of little short of fifty years, the British Association is to meet again this autumn in Dundee, on September 4–11, under the presidency of Prof. E. A. Schäfer. The former meeting in 1867 was a distinguished and memorable one, and many of the most eminent men of the time took part in it, among others Sir R. Murchison, Sir Charles Lyell, Sir David Brewster, and Sir William Thomson; Prof. Sharpey was president of anatomy, Sir Samuel Baker of geography, and Mr. Archibald Geikie of geology.

The memory of the 1867 meeting still survives in the town and district, and the citizens of Dundee are anxious, if it be at all possible, to make the forthcoming meeting no less successful. The necessary funds have been subscribed on a scale even more liberal than usual, and the offers of private hospitality from persons in and round the city are very numerous.

While Dundee is a commercial city, and by no means picturesque in itself, its situation is remarkably fine, and the views from the town over the estuary of the Tay, the Fife coast, and to the northward over the Sidlaw Hills, are exceedingly beautiful. In every direction the country affords easy and interesting excursions. Within short walking distance one has moorland and hill country, and not less attractive are the sandy wastes and dunes at the mouth of the river. A little farther one finds, for instance, the bold cliff scenery of the Forfarshire and Kincardine coasts, and all the Perthshire Highlands are within easy reach. Excursions are already arranged to such places as these, and the university town of St. Andrews and the ancient royal burghs of Arbroath and Dunfermline will each receive and entertain a party of visitors. Numerous other excursions are being planned for particular sections, and these will be more particularly described in forthcoming articles. The geologists, for instance, will find reopened for them the famous fossil fish-beds at Dura Den; they will also visit the neighbourhood of Stonehaven, the fossiliferous beds of the Lower Carboniferous in Fife, and will make, after the close of the meeting, a longer excursion to the western Highlands. The botanists will find work of unusual interest among the alpine flora of Clova and Glen Esk, celebrated by the discoveries of George Don. The agriculturists will have an opportunity of visiting some of the best farms in Scotland, and some of the best herds of polled Angus and other Scotch cattle.

The usual handbook of the meeting, now in the press, gives a complete account of the history of the town, its trade and local industries, and the topography and natural history of its neighbourhood. It is accompanied by a geological map containing much new material, and prepared, by the kind permission of the director, under the care of the staff of the Geological Survey in Edinburgh. Another and larger map depicts the flora, or "plant associations," of the adjacent parts of Forfar, Perth, and Fifeshire; it is reproduced from the work of the late Robert Smith, who was the first to introduce into this country this aspect of botanical study. The handbook is further enriched by several articles on distinguished men of science born in the district: for example, on Sir Charles Lyell, by Sir Archibald Geikie; on Robert Brown, by Colonel Prain; on George Don, the botanist, by Dr. Claridge Druce; and on Patrick Matthews, one of Darwin's most important precursors, by Dr. W. T. Calman.

The accommodation provided in the town for the meetings of the Association appears to be excellent. The reception room will be found in the Albert Institute, the principal building in the centre of the town. There, in addition to the main hall, is a suite of large galleries which will be used for conversation and writing rooms. The walls of these will be hung with a loan collection of pictures, which promises to be a very notable feature of the meeting. The great houses of the

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